

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A cyclic process for the removal of sulphur dioxide from a sulphur dioxide containing gas stream using an amine absorbent medium and for the regeneration of the absorbent medium comprising

a) contacting the gas stream with a lean aqueous absorbing medium containing a sulphur dioxide absorbent to absorb sulphur dioxide from the gas to form a sulphur dioxide lean treated gas stream and spent absorbing medium;

b) steam stripping gaseous sulphur dioxide from the spent absorbing medium at a temperature to form a regenerated aqueous absorbing medium;

c) recovering the gaseous sulphur dioxide;

d) ~~monitoring the regenerated aqueous absorbing medium and adjusting the level of heat stable salt to maintain the pH of the regenerated aqueous absorbing medium during the steam stripping process at a selected pH level of 6 or less; and~~

e) recycling the regenerated aqueous absorbing medium to the contacting step.

2. (Cancelled).

3. (Currently Amended) The process as claimed in claim 1 wherein the ~~selected~~ pH level is 5 or less.

4. (Currently Amended) The process as claimed in claim 1 wherein the ~~selected~~ pH level is determined based on a targeted concentration of total dissolved SO₂ in the regenerated aqueous absorbing medium.

5. (Original) The process as claimed in claim 4 wherein the targeted concentration of total dissolved SO_2 in the regenerated aqueous absorbing medium is less than 1.0 wt% based on the total weight of the regenerated aqueous absorbing medium.

6. (Original) The process as claimed in claim 4 wherein the targeted concentration of total dissolved SO_2 in the regenerated aqueous absorbing medium is less than 0.5 wt% based on the total weight of the regenerated aqueous absorbing medium.

7. (Currently Amended) The process as claimed in claim 1 wherein the absorbent is a diamine that is selected so that, in free base form, the diamine has a molecular weight of less than about 300 and the diamine in half salt form has having a pKa value for the free nitrogen atom of about 3.0 to about 5.5, the aqueous absorbing medium containing at least 1 mole of water for each mole of sulphur dioxide to be absorbed and having a heat stable salt concentration of greater than 1 equivalents of acid per mole of diamine prior to the lean aqueous absorbing medium contacting the sulphur dioxide containing gas.

8. (Currently Amended) The process as claimed in claim 1 wherein the absorbent is selected to have a pKa from 3.0 to 5.5 and the selected pH level is 5.5 or less.

9. (Currently Amended) The process as claimed in claim 1 wherein the absorbent is selected to have a pKa from 3.2 to 5.0 and the selected pH level is 5 or less.

10. (Currently Amended) The process as claimed in claim 1 wherein the absorbent is selected to have a pKa from 3.5 to 4.5 and the selected pH level is 5 or less.

11. (Currently Amended) A cyclic process for the removal of sulphur dioxide from a sulphur dioxide containing gas stream using an absorbent medium and for the regeneration of the absorbent medium comprising

a) contacting the gas stream with a lean aqueous absorbing medium containing a water-soluble half salt of a diamine to absorb sulphur dioxide from the gas to form a sulphur dioxide lean treated gas stream and spent absorbing medium, the diamine in free base form having a molecular weight of less than about 300 and the

diamine in half salt form having a pKa value for the free nitrogen atom of about 3.0 to about 5.5, the aqueous absorbing medium containing at least 1 mole of water for each mole of sulphur dioxide to be absorbed and having a heat stable salt concentration of greater than 1 equivalents of acid per mole of diamine prior to the lean aqueous absorbing medium contacting the sulphur dioxide containing gas;

b) steam stripping gaseous sulphur dioxide from the spent absorbing medium at a temperature to form a regenerated aqueous absorbing medium;

c) recovering the gaseous sulphur dioxide;

d) recycling the regenerated aqueous absorbing medium to the contacting step

e) ~~monitoring the pH of the regenerated aqueous absorbing medium and adjusting the level of heat stable salts in the aqueous absorbing medium to maintain the pH of the regenerated aqueous absorbing medium at a selected level of 6 or less.~~

12. (Original) The process as claimed in claim 11 wherein the gas stream is contacted with the aqueous absorbing medium at a temperature of from about 10° to about 60° C. to absorb sulphur dioxide from the gas stream in amounts of at least about 100 g of sulphur dioxide per kg of absorbing medium, and gaseous sulphur dioxide is stripped from the spent absorbing medium at a temperature of about 50° to about 110° C and at least about 30° C greater than the contact temperature to form the regenerated aqueous absorbing medium.

13. (Previously Amended) The process as claimed in claim 11 wherein the heat stable salt concentration of the lean aqueous absorbing medium prior to contacting the sulphur dioxide containing gas is selected to be from 1.03 to 1.7 equivalents of acid per mole of diamine.

14. (Previously Amended) The process as claimed in claim 11 wherein the heat stable salt concentration of the lean aqueous absorbing medium prior to contacting the sulphur dioxide containing gas is selected to be from 1.05 to 1.45 equivalents of acid per mole of diamine.

15. (Previously Amended) The process as claimed in claim 11 wherein the heat stable salt concentration of the lean aqueous absorbing medium prior to contacting the sulphur dioxide containing gas is selected to be from 1.1 to 1.3 equivalents of acid per mole of diamine.

16. (Previously Amended) The process as claimed in claim 11 wherein the heat stable salt concentration is selected to reduce the concentration of sulfur dioxide in the treated gas stream to a selected level.

17. (Previously Amended) The process as claimed in claim 11 wherein the heat stable salt concentration is selected to reduce steam consumption in the steam-stripping step.

18. (Previously Amended) The process as claimed in claim 11 wherein the heat stable salt concentration is selected to reduce steam consumption in the steam stripping step to an amount in the range 25 kg steam/kg SO₂ recovered to 2 kg steam/kg SO₂ recovered while producing a sulphur dioxide lean treated gas stream having less than 10 ppm SO₂.

19. (Previously Amended) The process as claimed in claim 11 wherein the heat stable salt concentration is selected to reduce steam consumption in the steam stripping step to an amount in the range 10 kg steam/kg SO₂ recovered to 2 kg steam/kg SO₂ recovered while producing a sulphur dioxide lean treated gas stream having less than 50 ppm SO₂.

20. (Previously Amended) The process as claimed in claim 11 wherein the heat stable salt concentration is selected to reduce steam consumption in the steam stripping step to an amount in the range 10 kg steam/kg SO₂ recovered to 2 kg steam/kg SO₂ recovered while producing a sulphur dioxide lean treated gas stream having less than 20ppm SO₂.

21. (Cancelled)

22. (Cancelled).

23. (Currently Amended) The process as claimed in claim 11 wherein the selected pH level is 5 or less.

24. (Currently Amended) A method of reducing the concentration of sulfur dioxide in a treated gas stream comprising:

a) contacting a gas stream with an aqueous absorbing medium containing an amine capable of forming an amine salt, heat stable salt and sulfite, the amine having a pKa less than that of sulfite;

b) stripping gaseous sulphur dioxide from the spent absorbing medium at a temperature to form a regenerated aqueous absorbing medium;

c) recovering the gaseous sulphur dioxide;

d) recycling the regenerated aqueous absorbing medium to contacting step (a); and,

e) adjusting the heat stable salt concentration of the aqueous absorbing medium to have a heat stable salt concentration sufficient to favour dissolved SO₂ being in the form of bisulfite and not sulfite during stripping of gaseous sulphur dioxide from the spent absorbing medium ~~at least essentially neutralize the sulfite in the aqueous absorbing medium such that~~ and the pH of the regenerated aqueous absorbing medium is 6 or less.

25. (Previously amended) The method as claimed in claim 24 wherein the amine is part of a diamine and the method comprises adjusting the heat stable salt concentration of the aqueous absorbing medium to be greater than 1 equivalents of acid per mole of diamine.

26. (Previously Amended) The method as claimed in claim 24 wherein the aqueous absorbing medium contains a water-soluble half salt of a diamine to absorb sulphur dioxide from the gas stream to form a sulphur dioxide lean treated gas stream and a spent aqueous absorbing medium, the diamine in free base form having a molecular weight of less than about 300 and the diamine in half salt form having a pKa value for the free nitrogen atom of about 3.0 to about 5.5, the aqueous absorbing medium

containing at least 1 mole of water for each mole of sulphur dioxide to be absorbed and comprising less than about 80 wt. % of water and the method comprises adjusting the heat stable salt concentration of the aqueous absorbing medium to be from 1.05 equivalents of acid per mole of diamine to 1.45 equivalents of acid per mole of diamine.

27. (Currently Amended) The method as claimed in claim 24 wherein the method further comprises adjusting the aqueous absorbing medium to have a heat stable salt concentration sufficient such that dissolved SO₂ is to-at least essentially in the form of bisulfite and not sulfite ~~neutralize the sulfite in the aqueous absorbing medium.~~

28. (Original) The method as claimed in claim 24 wherein the method further comprises adjusting the composition of the aqueous absorbing medium such that the pH of the regenerated aqueous absorbing medium is 5.0 or less.

29. (Cancelled)

30. (New) The process as claimed in claim 1 wherein the absorbent has an amine with a lower pKa and an amine with a higher pKa and the aqueous absorbing medium has a heat stable salt concentration to neutralize the amine with a higher pKa prior to the lean aqueous absorbing medium contacting the sulphur dioxide containing gas.

31. (New) The process as claimed in claim 1 wherein the absorbent is a diamine having a weaker amine and a stronger amine and the aqueous absorbing medium has a heat stable salt concentration sufficient to neutralize the stronger amine and a portion of the weaker amine prior to the lean aqueous absorbing medium contacting the sulphur dioxide containing gas.

32. (New) The process as claimed in claim 1 wherein the heat stable salt concentration of the lean aqueous absorbing medium prior to contacting the sulphur dioxide containing gas is selected to be from 1.03 to 1.7 equivalents of acid per mole of diamine.